

CLAIMS:

1. A pulse width-modulated noise shaper (210; 410), comprising:
an input adder (11) having a first input for receiving an input signal (S_{in}), and a second input;
an output terminal;
5 a main filter (130) having an input coupled to receive an output signal from said input adder (11);
a pulse width modulation circuit (220) having an input coupled to receive a signal derived from an output of said main filter (130), an output coupled to an output terminal of the pulse width-modulated noise shaper, and operable at a clock frequency (f_{ck});
10 a feedback path (216; 266) coupled between the output terminal and the second input for generating a feedback signal (S_{FB}) and for feeding this feedback signal (S_{FB}) back to the second input, the feedback path (216; 266) and the main filter (130) being operable at a clock frequency of at least the clock frequency (f_{ck}) of the pulse width modulation circuit (220).
- 15 2. A pulse width-modulated noise shaper (210; 410) according to claim 1, further comprising a power stage (260), coupled between the output of the pulse width modulation circuit (220) and the output terminal, the feedback path (266) comprising means for analog-to-digital conversion (240, 244, 245, 246).
- 20 3. A pulse width-modulated noise shaper (210; 410) according to claim 2, wherein the means for analog-to-digital conversion (240, 244, 245, 246) comprise:
a second adder (240) having a first input (241) coupled to the output terminal;
a loop filter (244) having an input coupled to receive an output signal from said second adder (240);
25 an analog-to-digital converter (245) having an input coupled to receive an output signal from said loop filter (244), and an output coupled to the second input of the input adder (11);
and a digital-to-analog converter (246) having an input coupled to receive an output signal from the analog-to-digital converter (245), and an output coupled to a second input (242) of the second adder (240).

4. A pulse width-modulated noise shaper (210; 410) according to claim 3, wherein said analog-to-digital converter (245) has a resolution of less than 5 bits.

5 5. A pulse width-modulated noise shaper (210; 410) according to claim 2, wherein said pulse width modulation circuit (220) and said power stage (260) comprise: a first branch comprising a first comparator (310), and a first class-D power stage (350) having an input coupled to receive an output signal from said first comparator (310), said first comparator (310) having a first input (311) coupled to receive the signal derived
10 from the output signal of said main filter (130), and said pulse width modulation circuit (220) further comprising a reference signal generator (380) having an output coupled to a second input (312) of said first comparator (310).

6. A pulse width-modulated noise shaper (210; 410) according to claim 5,
15 wherein said pulse width modulation circuit (220) and said power stage (260) further comprise:
a second branch comprising a second comparator (320), and a second class-D power stage (360) having an input coupled to receive an output signal from said second comparator (320); said second comparator (320) having a first input (321) coupled to receive a signal which is
20 inverted with respect to the signal derived from the output signal of said main filter (130), and said reference signal generator (380) having an output coupled to a second input (322) of said second comparator (320).

7. A pulse width-modulated noise shaper (210; 410) according to claim 6,
25 wherein said feedback path (266) comprises means (290) for subtracting a feedback signal derived from said first class-D power stage (350) output (352) and a feedback signal derived from said second class-D power stage (360) output (362).

8. A digital-to-analog converter (300) comprising a pulse width-modulated noise
30 shaper (210; 410) according to claim 1.

9. An electronic apparatus comprising a pulse width-modulated noise shaper (210; 410) according to claim 1 and signal processing circuitry for providing the input signal (S_{in}) in a digital format.